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The Treatment of Bovine Streptococcal and Staphylococcal Mastitis with Nisin

By

J. I. TAYLOR

AGRICULTURAL RESEARCH COUNCIL FIELD STATION, COMPTON, BERKS.

and

A. HIRSCH and A. T. R. MATTICK

NATIONAL INSTITUTE FOR RESEARCH IN DAIRYING, SHINFIELD, BERKS.

An antibiotic substance, nisin, prepared from *Str. lactis*, was described by Mattick & Hirsch (1944). As supplies of penicillin for the treatment of bovine mastitis were not available during the war years an alternative antibiotic was desirable, and investigations into the therapeutic properties of one of these, nisin, were extended. Work with penicillin has indicated that to obtain the maximum effect in sterilising the udder infected with mastitis organisms, it must be infused on several successive days. When it was shown (Mattick & Hirsch, 1947) that nisin was apparently bactericidal and that a single dose was therapeutically effective against severe streptococcal infections in mice, it was decided to test the value of a single udder infusion of nisin for the treatment of streptococcal and staphylococcal mastitis.

IRRITANCY TESTS ON NORMAL COWS

It is important that any substance to be used for udder infusion shall be non-irritant. In order to investigate the possible irritant action of nisin, comparable groups of normal cows were infused with (*a*) nisin suspended in arachis oil and (*b*) arachis oil alone. The irritant action of the substance was assessed by its effect on milk yield, the physical appearance of the milk, the presence or absence of clots and on occasion by an elevation of temperature and an increase in the pulse rate and also by an increase in the cell count of the milk. These criteria showed the first batches of nisin to be highly irritant. It appeared that this irritancy was due to the particle size of the nisin which was 200μ^2. The size was, therefore, reduced in further batches of nisin to 10μ^2, until no appreciable loss of yield was observed. This suggested that nisin could be safely used in practice, and trials to test its effect against streptococcal and staphylococcal infections were then carried out.

TREATMENT

Each infected udder was infused with 1·0 ml. per quarter of nisin-in-oil, containing either 2,500,000 or 5,000,000 units of nisin per ml. (50 nisin units = approximately 1 penicillin unit on the basis of biological activity *in vitro*.)

EXPERIMENTAL ANIMALS

Twelve herds infected with *Str. agalactiae* were selected from several counties in England—Berkshire (six), Wiltshire (three), Gloucestershire (one), Cheshire (one), and Hampshire (one). These herds were found to have a high infection rate with some clinical cases of streptococcal mastitis and no general herd treatment had previously been carried out. Thirteen cows harbouring staphylococci and two affected with *Str. dysgalactiae* were also treated.

SAMPLING AND BACTERIOLOGICAL EXAMINATION

The milk of each of the cows in each herd was examined by a technique described in the Report of the Imperial Bureau of Animal Health (1944). Within the week prior to treatment at least two milk samples from each animal were taken on different days. Cows giving milk samples containing 500 colonies per ml. or more, by the *direct* test (Report, 1944) were selected for treatment with nisin. The milk of each cow was examined at 10 and at 21 days after treatment by the *direct* and by the *enrichment* method, the criterion of success being the complete absence of organisms as indicated by the latter method. Streptococci were identified by serological tests.

PERSISTENCY OF NISIN IN THE MILK OF TREATED COWS

There was a marked variation from cow to cow, and even from quarter to quarter, in the concentration of detectable nisin in the milk following infusion of five million units per quarter, and 12 hours after infusion, titres estimated by the method described by Mattick & Hirsch (1947), ranged from 600 to 6,000 units of nisin per ml. of milk. The duration of persistency ranged from two to five days with an average period of three days irrespective of the concentration recorded 12 hours after infusion.

RESULTS OF TREATMENT WITH 2½ MILLION UNITS OF NISIN IN COWS INFECTED WITH *Str. agalactiae*

Thirty-seven infected cows in six herds were treated by a single intramammary infusion of nisin into all quarters as shown in the Table and at 10 and 21 days after treatment their milk was examined bacteriologically by the enrichment method for the presence or absence of *Str. agalactiae*. One cow went dry after infusion and one died of metritis before the final test. Thus, 35 cows remained to be tested on the 21st day; of these, 30 were free from infection and five remained infected. Ten of the cases showed clinical evidence of mastitis at the time of infusion and six of these were free from infection at 21 days. Four remained infected but the clinical condition of each was much improved.

TABLE

SUMMARY OF THE RESULTS OF TESTING THE CURATIVE VALUE OF A SINGLE INTRAMAMMARY INFUSION OF 1 ML. OF NISIN PER QUARTER IN COWS HARBOURING MASTITIS ORGANISMS

Organism	Unitage of Nisin per quarter	Number of herds	Number of cows twice positive before treatment	Post-treatment bacteriological tests: 10 days +	10 days —	10 days %	21 days +	21 days —	21 days %	Number of cases clinical before treatment	Number of cases clinical after treatment: 10 days	Number of cases clinical after treatment: 21 days
Str. agalactiae...	2½ million	6	37	3	33 (1 dry)	89	5	30 (1 died metritis)	86	10	2	4
" " ...	5 "	6	37	1	36	97	2	35	95	3	0	0
Staph. aureus ...	2½ "	3	3	1	2	—	1	2	—	2	0	0
" " ...	5 "	6	10	0	10	—	1	9	—	0	0	0
Str. dysgalactiae	2½ "	2	2	2	0	—	2	0	—	2	2	2

Results of the Treatment with 5 Million Units of Nisin on Cows Infected with *Str. agalactiae*

Thirty-seven infected cows in six herds were treated by a single intramammary infusion of all quarters and 10 days later only one was found to remain infected. This and a second cow in the same herd were found to be infected after 21 days. Thus 35 of the 37 cows were apparently cured.

One herd in this group had 14 infected cows, three of which showed clinical symptoms at the time of infusion. Of the 14 animals treated, all were reported to have given abnormal milk repeatedly during the month prior to treatment. All were apparently freed from infection and the three clinical cases showed an apparent return to normal.

Results of the Treatment with 2½ or 5 Million Units of Nisin on Cows Harbouring Haemolytic Staphylococci in the Udder

Although *in vitro* tests of the bactericidal action of nisin on staphylococci were not encouraging, it was decided to test some of the limited supplies available on udders harbouring staphylococci. Accordingly, three infected animals with abnormal milk were treated each with 2½ million units per quarter of nisin-in-oil. Tests at 10 and 21 days after treatment showed that in two cases infection had been eliminated and the milk had become normal.

Following this, a further group of ten cows which were regularly yielding not less than 500 colonies of haemolytic staphylococci per ml. were treated with 5 million units per quarter. Ten days later examination of the milk showed no infection but after 21 days one cow was found to be infected. All the cows treated would be classed as sub-clinical cases, but no opportunity occurred of testing the effect of the product on the acute staphylococcal infection.

Results of the Treatment with 2½ Million Units of Nisin on Cows Infected with *Str. dysgalactiae*

Two cows with *Str. dysgalactiae* infections failed to respond to an infusion of 2½ million units. This, however, was not unexpected since the organism is resistant to nisin *in vitro*.

Discussion

The preliminary trials showed that infusions of nisin into the udder caused irritation. When the particle size of the product was reduced, however, preparations of nisin-in-oil, which were less irritant, were obtained until eventually some batches were produced which caused no perceptible fall in the milk yield. Further, there appeared to be no correlation between the nisin concentration and irritancy. The effect was the same whether 1, 2½ or 5 million units per quarter were given and thus the irritant effect of the earlier batches appeared to be due mainly to the large particle size of the product.

A striking feature of these trials was the high percentage of cases cured with a single infusion of 1 ml. of nisin-in-oil per quarter. This may be due to the marked bactericidal property of nisin and to its high surface activity which in turn may explain its tendency to persist in the udder for long periods.

In experiments such as these where infection is liable to be spread from infected to non-infected cows during milking, it is almost impossible to have true controls. In the herds under consideration, however, not less than a third of the infected animals was left untreated. No case of spontaneous recovery from infection in the controls was encountered and in the Cheshire herd, infections in the 19 non-treated animals increased from seven to 13 during the 21 day period of observation while the infections in the treated cows fell from 14 to nil during the same period.

Summary

Single intramammary infusion of the antibiotic substance, nisin, was used to treat 72 bovine udders infected with *Str. agalactiae*. Using 5 million units per quarter 35 of 37 cases were cured, while with 2½ million units per quarter, 30 out of 35 udders were free of infection 21 days later. Similar encouraging results were secured in the treatment of staphylococcal infections of the udder in that nine of ten infected udders were sterilised with a single intramammary infusion of 5 million units per quarter. Two infections of *Str. dysgalactiae* did not respond to treatment.

Work is in progress to determine whether nisin can be manufactured on a large scale commercially, but before it can be made available for general use it will be necessary to conduct further trials.

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Tick Control Measures

Assessment of the Value of Chemical Tickicides for *Boophilus (Margaropus) annulatus* var. *microplus* in Jamaica

By

R. M. ARNOLD

PART I. LABORATORY EXPERIMENTS

Introduction

Few experiments appear to have been recorded on the effect of tickicides under laboratory conditions, and there has been considerable scepticism amongst veterinary entomologists as to the value of laboratory tests for this purpose.

Omar-Cooper (1945) following on the reports of du Toit (1941) records laboratory experiments with *Boophilus decoloratus* (Koch) in South Africa which appeared to demonstrate resistance to arsenical dip fluids. He gave few details of technique.

Since the work reported in this paper was completed, two papers giving details of laboratory technique and results have come to the author's attention. Laws (1948) and Whitnall and Bradford (1947) describe methods essentially similar to those used in the work here reported ("Prolonged contact"). In each case the period of contact of the tick with the insecticide was, in the opinion of the author, far longer than occurs under field conditions of dipping. The methods described, however, give consistent results which appear reliable enough to form a basis of assessment of the probable value of the compound in the field. No trials with larvae or immature forms are reported.

Other authors mention laboratory trials of egg laying, viability of ova, etc., after dipping, but these are usually with samples of ticks taken from animals after dipping under field conditions.

The value of a routine method for trial of tickicides on a laboratory scale is evident to all who have been faced with the organising of field trials for new agents. Field scale trials are difficult to organise, controls difficult to arrange and the results are difficult to record and interpret. They are also wasteful of material and of time, in that large amounts of dip must be available for spraying or filling vats and that long periods are usually required before ecological conditions have been sufficiently varied to give a fair test.

The assessment of the value of tickicides presents a number of problems in that existing methods of laboratory trials seldom give results that are confirmed when the product comes into field use. The simple laboratory tests described below give a general idea of results to be expected when large scale trials are undertaken, but care is needed in the interpretation of results.

This paper describes the results of laboratory experiments in the use of dip fluids containing arsenic trioxide, B.H.C. (benzene-hexachloride), DDT ((2:2-bis (p-p-Chlorophenyl)-1:1:1-trichloroethane)) and chlordane (Octochloro-4-7 metranotetrahydrocridane) on *Boophilus annulatus* var. *microplus* (the Texas Fever Tick). Following on the results of laboratory experiments field trials were carried out using the same compounds both sprayed on to the animal and in dipping vats; these experiments are described in Part II of the paper.

In the laboratory two stages in the tick's life history are accessible for study—the larvae before attachment and the replete adult females. Owing to the fact that *Boophilus* is a one-host tick and nymphs are obligate parasites, these stages can be studied only on live cattle. Similarly any special susceptibility of the tick to tickicides at the time of moulting can be studied only on the live animal.

Composition of Dip Solutions Tested

Arsenic Compounds.—Solutions of arsenic trioxide were prepared by dissolving calculated weight of the salt in water, heating until dissolved and then making up to the original volume of water.

"Arsenic-paranaph" is the standard dip solution recommended by the Agricultural Department. It is prepared by dissolving 2 lb. arsenite of soda in 8 quarts of cold water (this requires some time and considerable stirring) and mixing with this 3 lb. of paranaph. This makes 100 gallons of dip (0·20 per cent. arsenite of soda). Paranaph is a wetting agent composed of kerosene (paraffin) oil, soft soap and naphthalene. Two gallons of water are added to 56 lb. soft soap and boiled. Seven lb. crude naphthalene are then added and 2 gallons kerosene oil, boiling and stirring until a uniform semi-solid product is obtained.

Cooper's Cattle Dip diluted 1 : 150 contains 0·22 per cent. arsenite of soda plus wetting and suspending agents.

The strength of arsenical solutions was checked by the iodine-starch method.

B.H.C. Dips.—"Gammatox" paste contains 50 per cent. benzene-hexachloride and 50 per cent. dispersion agent, but contains only 6·5 per cent. of the active gamma-isomer. It was used diluted 1 : 250 (spray), 1 : 500 (dip-strength) and 1 : 1,000.

"Agrocide" powder was used for a number of trials. The material used contains 0·5 per cent. of gamma-isomer of B.H.C.

"Wettable Agrocide" is a 50 per cent. B.H.C. preparation with 50 per cent. wetting and dispersing agent, "Goulac."

DDT Dip.—This dip, an emulsion, was originally marketed as a sheep dip. It contains 15 per cent. of active DDT. It was used diluted 1 : 29 (spray strength) and 1 : 59 (dip strength), giving final concentrations of 0·5 per cent. and 0·25 per cent. DDT.

Chlordane Dips.—Chlordane is a by-product from the synthetic rubber industry. The solution used contains 50 per cent. chlordane (60 per cent. of the active ingredient octochloro 4-7-metrano-tetra hydrocridane (chlorodan) with 40 per cent. related compounds) with 50 per cent. wetting agent and is marketed under the name "Synklor 50W." It was used diluted 1 : 67 (spray strength) and 1 : 200 and 1 : 400. Chlordane is said to be five times less volatile than benzene hexachloride.

Various combinations of the above dips and of others with a variety of wetting agents such as sulphonated lauryl alcohol also were used.

Methods and Observations

(*a*) Using Replete Adult Females

Procedure.—Batches of fully engorged female ticks were removed from cattle which had no record of dipping for at least the previous two weeks. Care was taken in removal to avoid damage to the body or mouth parts of the ticks. The ticks were divided into groups of equal numbers for dipping in the various solutions.

Each group of ticks was lowered in ½ in. mesh wire baskets into the fluids in beakers. They were held under the surface and gently agitated to allow penetration of the dip.

In the first few trials groups were duplicated in each test solution at three seconds and 15 seconds immersion. No significant difference was observed in the effects of these differing periods of immersion either in percentage killed, number of eggs laid, or viability of eggs. It was concluded that provided adequate wetting of the ticks takes place the period of exposure is of no significance. Subsequent experiments were conducted using a uniform immersion period of five seconds. In the tables below the results from the three to 15 second immersions are listed together.

After dipping the ticks were emptied on to a clean dry filter paper and left for half an hour on the bench to dry. They were then placed between two sheets of dry filter paper in a petri dish and stored in a dark cupboard insulated from temperature variations. A dish of water was placed in the cupboard to maintain high humidity.

Observations were made at one day, seven days, 14 days, 21 days, 28 days and 35 days, on viability, activity, oviposition, etc., but only the data presented below seems worth presenting.

In all laboratory experiments with ticks strict attention to detail is needed to ensure that conditions are exactly duplicated with each batch. Small variations of the humidity or in the speed of drying affect the survival rate markedly.

(*b*) Other Experiments with Replete Adult Females

Owing to the poor kills obtained with B.H.C. and Chlordane on adults using the above technique it was decided to try the effect of longer periods of contact with the tickicides.

Two filter papers were soaked in the test solution and shaken to remove any surplus. One was laid on to the bottom of the petri dish and the groups of ticks under tests placed on it. They were covered by the second paper and left for three hours with the lid removed from the petri dish. By this time the top paper was almost dry and was removed and the lid of the dish replaced. The lower sheet of paper with the ticks on it usually remained moist for another 24 hours.

This method is comparable to that used by Whitnall (1947).

Similar dip solutions were tested, the results being given in Table II (overleaf).

(*c*) Experiments Using Larvae

Procedure.—Filter papers were placed on a clean bench and one drop of the test fluid was allowed to fall on the centre of each. When this was dry the papers were placed in a petri dish and a number of tick larvae, hatched four to seven days previously, deposited on the side of the paper, the lid being replaced immediately.

Once disturbed, tick larvae are very active and wander over all parts of the inner surface of the dish and filter paper. It

Table I: Short Immersion in Test Fluid

Tickicide under test	No. of tests	Total No. of ticks	Ticks dead after 7 days		Ticks laying ova		Ova		Approximate percentage viable ova	Remarks
			No.	%	No.	%	No. in 1,000s	Average No. per tick		
Arsenious oxide 0·45%	3	65	63	97·0	2	3·0	0·5	8	0	
" " 0·40%	3	65	58	89·3	6	9·2	0·6	10	0	
" " 0·35%	3	65	54	83·2	10	15·2	2·2	34	0	
" " 0·30%	4	95	68	71·8	11	11·6	2·8	30	0	
" " 0·25%	5	105	61	58·1	27	26·7	10·6	104	0	
" " 0·20%	5	105	57	54·3	36	34·4	19·5	186	0	
" " 0·15%	5	105	43	41·0	45	42·8	28·2	258	0	
" " 0·10%	5	105	19	18·1	76	72·4	68·9	656	1	
" " 0·05%	4	80	6	7·5	74	92·5	119·2	1,492	5	
" " 0·20% + wetter	1	40	36	90·0	4	10·0	0·3	7	0	Sulphonated lauryl alcohol—"Dupernol" as wetter
" " 0·10% "	1	40	7	17·6	31	77·6	15·1	377	0	" " "
" " 0·20% + Paranaph	7	155	120	77·4	16	10·3	4·2	27	0	"Govt. Dips" full strength—dip or spray
" " 0·10% "	6	139	46	35·4	80	61·5	96·2	740	15	" half strength
Coopers cattle dip (0·22% As_2O_3)	5	100	80	80·0	18	18·0	17·4	174	5	Full strength (1 : 150)—spray or dip
" " (0·11% As_2O_3)	5	100	67	67·0	33	33·0	30·4	304	10	Half strength (1 : 300)
"Gammatox" dip 1 : 250 ..	2	70	4	5·7	17	24·3	15·1	216	40	0·026% Gamma isomer of B.H.C.—variation between batches—spray
" " 1 : 500 ..	7	155	33	21·3	124	80·1	204·4	131	75	0·013% Gamma isomer of B.H.C.—spray or dip
" " 1 : 1,000 ..	6	140	20	14·3	98	70·0	165·6	1,180	95	0·0065% Gamma isomer of B.H.C.—dip
" " + wetters ..	8	200	2	1·0	198	99·0	374·8	1,374	90	Gives similar results with different wetters and at different dilutions
B.H.C. with dispersing agent ..	3	120	5	42·0	107	89·0	113·4	939	90	"Wettable Agrocide"—similar results with differing dilutions
4% B.H.C. dusting powder ..	2	30	28	93·3	2	6·7	1·0	33	0	"Agrocide No. 3"—washing after dusting reduces kill and permits egg laying
DDT emulsion dip 1 : 29 ..	8	185	131	70·8	43	13·2	50·9	274	20	0·5% active DDT—spray
" " " 1 : 59 ..	4	90	66	73·3	24	26·7	46·1	512	45	0·25% " —dip
" " 1 : 59 plus Gammatox dip 1 : 1,000	3	80	62	77·6	0	0	0	0	—	
DDT emulsion 1 : 59 plus Synklor 1 : 134	1	30	2	6·7	6	20·0	7·4	247	50	
Chlordane dip 1 : 100	2	40	1	2·5	36	97·5	85·4	2,140	90	"Synklor 50W". 0·05% Chlordane with wetting agent—spray
" 1 : 200	2	40	4	10·0	35	87·5	88·6	2,220	80	"Synklor 50W". 0·025% Chlordane with wetting agent—dip
" 1 : 400	2	40	4	10·0	32	80·0	87·7	2,190	90	"Synklor 50W". 0·0125% Chlordane with wetting agent—dip
Tap water	10	265	19	9·2	180	87·8	338·1	1,652	95	Control batch used for each group

TABLE II: PROLONGED CONTACT WITH DIP FLUID

Dip fluid under test	No. ticks	Ticks dead after 7 days		Ticks laying ova		Ova			Remarks
		No.	%	No.	%	No. in 1,000s	Average No. per tick	Approximate per cent. viable	
Coopers cattle dip 0:22% As_2O_3	20	0	0	18	90	18·1	905	0	Full strength
"Gammatox" dip 1:250	20	17	85	0	0	—	—	—	Activity of ticks enhanced
"Gammatox" dip 1:500	20	15	75	0	0	—	—	—	" "
DDT dip 1:29	20	3	15	17	85	13·8	690	20	Activity and oviposition stimulated
" 1:59	20	8	40	13	65	12·0	600	10	" "
Chlordane dip 1:100	20	8	40	0	0	—	—	—	
Chlordane dip 1:200	20	2	10	18	90	7·0	350	20	Activity and oviposition stimulated
Tap water ..	20	0	0	20	100	30·6	1,530	95	—

can be assumed that, sooner or later, all would cross the treated portion of the paper. Thus results give an indication of the value of the test solution as a contact poison to the larvae stage.

The dishes were left on the bench and observations made daily of the approximate percentages of larvae dead in each. Once left for a few hours, live larvae collected in batches on the highest part of the dish lid nearest the source of light, while those dead were scattered over the bottom of the dish and filter paper. The toxic symptoms usually observed were enhanced motility with increasing inco-ordination until the larva fell on to its back with the legs waving in the air. Death supervened in about twelve hours from this time.

Accurate counting of live tick larvae is difficult and the figures given in Table III are estimates. The differences between solutions are so clear-cut, however, that errors smaller than 5 per cent. are not important.

It is possible that a certain amount of toxic effect arises from the volatile components of the dip evaporating and filling the petri dish with fumes. This alone cannot account for the results obtained and some contact action seems to be involved. Thus although B.H.C. is more volatile than chlordane it is apparently no more effective as judged by this test.

TABLE III

Dip fluid under test	No. tests	Approximate No. larvae	Approximate percentage viable after					Remarks
			1 day	2 days	3 days	4 days	7 days	
0·40% As_2O_3	3	2,400	100	95	95	95	90	
B.H.C. dip ..	4	2,700	10	5	0	0	0	
Chlordane dip	1	2,000	10	0	0	0	0	
DDT dip ..	4	2,700	100	90	30	25	25	Some variation between groups
Tap water ..	4	2,700	100	95	95	90	90	

Discussion of Results

Arsenic-Containing Dips.—Low dilutions (0·05 per cent.) of arsenious oxide had a consistently stimulating effect upon the viability of ticks after dipping and upon the number of ticks ovipositing, as compared with controls dipped in tap water. This effect did not extend to the number of eggs laid, which was less in the arsenic-dipped ticks, nor to the viability of the ova which was only 5 per cent. in the groups dipped in 0·05 per cent. arsenious oxide as against 95 per cent. in the water-dipped controls. Thus the effect of 0·05 per cent. arsenious oxide appears to be to enhance survival and oviposition, although the eggs laid are mostly infertile. With higher concentrations of arsenic the percentage of viable ova falls rapidly—with 0·10 per cent. arsenious oxide a 1 per cent. hatch is obtained while with 0·15 per cent. arsenious oxide no viable ova were deposited. Arsenic solutions appear to delay oviposition and hatching by several days.

The percentage of arsenic in the usual dip-fluids (0·20 to 0·25 per cent.) gave kills of 54·3 to 58·1 per cent. of engorged ticks. Such ticks on an animal dipped in fluids of this arsenic content would drop off the animal, and about 50 per cent. would oviposit, but the ova laid could be expected to be infertile.

The addition of wetting agents improves the killing properties of arsenious oxide in these strengths. Thus Cooper's dip (0·22 per cent. As_2O_3) gives a kill of 80·0 per cent. and arsenic-paranaph dip (0·20 per cent. As_2O_3) a kill of 77·4 per cent., but oviposition occurs to some extent in the case of the former. It is highly probable that under field conditions laying of viable eggs occurs to some extent after immersion in these dips even under ideal conditions.

Arsenic has no action as a contact poison on larvae nor could it be expected to have any residual effect. Its action is due to direct action on all stages of the tick at the time of dipping. A marked feature is the non-viability of ova laid. This appears to be caused by far smaller amounts of arsenic than causes death of adults. Thus prolonged contact with Cooper's dip caused a decrease in numbers of ova laid but none of these were viable (Table II). In this experiment there was little opportunity for oral ingestion of arsenic by the tick but the eggs were deposited on filter paper impregnated with (dried) Cooper's dip.

B.H.C. Dips.—The poor kills obtained with dipping ticks in B.H.C. fluids are at first sight startling in view of the known efficacy of these dips under field conditions. B.H.C. does not act as a contact poison for adult fully-engorged ticks. Even after immersion in double the recommended dipping strength, only 5·7 per cent of the ticks were killed and 24·3 per cent. of them laid ova of which 40 per cent. were viable. With lower dilutions results were even more disappointing. Prolonged contact with the dip, however, gives 85 per cent. kill after seven days and complete inhibition of egg laying.

With larvae the results are spectacular. Under the conditions of the test less than 10 per cent. of larvae were alive after one day. Part of this lethal action may have been due to volatility of the B.H.C. inside the petri dish but there is also direct contact action.

A noticeable feature of dipping in B.H.C. fluids is the enhanced motility of the ticks following dipping. Oviposition begins one or two days earlier than the water-dipped controls and is completed in a shorter period. This was not reported by Whitnall (1947) although the flattening and grooving of the ticks reported by him was noted.

It is to be expected that B.H.C. dips would cause dropping off of replete or near replete ticks from cattle dipped owing to its excitant action. Such ticks would lay fertile eggs. Larvae and probably other immature stages attempting to attach to a B.H.C. impregnated coat would succumb.

Addition of various wetting agents failed to enhance the efficacy of B.H.C. Among those tried were paranaph, sulphonated lauryl alcohol and soaps; emulsions containing B.H.C. also behaved similarly.

As a dusting powder 4 per cent. B.H.C. (Agrocide No. 3) was highly efficacious in killing ticks. The actual amount of B.H.C. reaching each tick is large and if reduced by subsequent washing in water the percentage kill is reduced and egg laying occurs.

DDT Dips.—These give variable and on the whole less satisfactory results. There is a direct toxic effect but a poor kill results from prolonged contact. Even with double the recommended dipping strength some fertile ova are laid.

As a contact poison the toxicity to larvae is low.

In conjunction with B.H.C. dip each used at half the recommended strength excellent results were obtained in the laboratory trials. In no case did any dipped ticks survive for seven days nor were any ova laid. It appears that there is some synergic action.

Chlordane Dips.—The action of chlordane as a tickicide appears similar to that of B.H.C. It is, however, less volatile and could be expected to be more stable under field conditions. The apparently enhanced oviposition from ticks dipped in chlordane dips (Table I) is not real, as fully engorged ticks were used for these tests and the tap water control figures include some groups which were partly engorged and not capable of such heavy egg production. Oviposition commenced sooner and ended more rapidly than with water dipped ticks.

"Synklor" was lethal to larval ticks, apparently acting as a contact poison; as is the case with B.H.C. it causes increased activity followed by incoherent movements and death.

VARIATION IN SUSCEPTIBILITY TO ARSENIC

The variation between groups of ticks to arsenious oxide solutions was tested in order to form an opinion as to whether the ticks of the island were becoming resistant to arsenic dips, as has been so often claimed by cattle owners experiencing difficulty with tick control.

The salient figures from the five trials summarised in Table I are given in more detail in Table IV. This shows the effect of various strengths of arsenious oxide on groups of ticks from various parts of the island as shown by the percentage dead at seven days, the percentage ovipositing and the approximate number of ova

laid. (Of these only 1 per cent. of the eggs from the ticks dipped in 0·10 per cent. arsenic and 5 per cent. of those from ticks dipped in 0·05 per cent. arsenic hatched.)

TABLE IV: REACTION TO ARSENIC IN GRADED AMOUNTS

Group	No. 1 10 ticks in group	No. 2 30 ticks in group	No. 3 10 ticks in group	No. 4 30 ticks in group	No. 5 25 ticks in group	Average all groups
Source of ticks	Unknown	Portland	St. Mary	Unknown	Unknown	
Arsenic strength			Percentages dead at 7 days			
0·45%	90	100	—	—	96	97·0
0·40%	80	98	—	—	84	89·3
0·35%	70	98	—	—	72	83·2
0·30%	100	93	—	100	64	71·8
0·25%	70	93	40	93	48	58·1
0·20%	40	83	30	100	36	54·3
0·15%	10	87	10	80	28	41·0
0·10%	0	40	20	57	12	18·1
0·05%	0	7	0	10	—	7·5
Tap water	0	3	10	0	0	9·2
			Percentages ovipositing			
0·45%	10	0	—	—	4	3·0•
0·40%	10	0	—	—	16	9·2•
0·35%	20	3	—	—	28	15·2•
0·30%	0	7	—	0	36	11·6•
0·25%	30	7	70	7	52	26·7•
0·20%	60	23	70	0	64	34·4•
0·15%	70	0	90	23	72	42·8•
0·10%	90	60	100	63	88	72·4‡
0·05%	90	93	100	90	—	92·5‡
Tap water	80	97	100	100	96	87·8§
			Approximate No. eggs per tick			
0·45%	30	0	—	—	10	8•
0·40%	10	0	—	—	120	10•
0·35%	80	10	—	—	56	34•
0·30%	0	10	—	0	100	30•
0·25%	50	30	230	30	240	104•
0·20%	390	110	380	0	190	186•
0·15%	530	60	1,150	100	260	258•
0·10%	1,790	990	1,030	280	1,080	656‡
0·05%	1,600	2,180	1,430	740	—	1,492‡
Tap water	2,370	3,080	1,480	1,580	1,450	1,652§

• Ova infertile. ‡ Approximately 5% of ova viable.
† Approximately 1% of ova viable. § „ 95% „ „

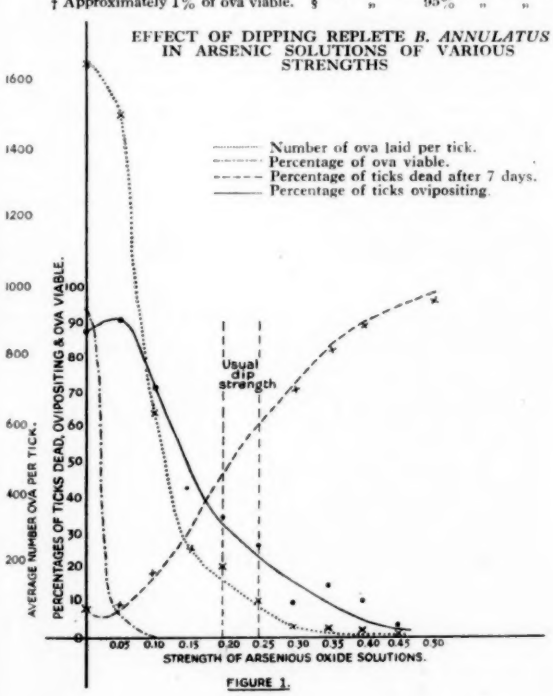
EFFECT OF DIPPING REPLETE B. ANNULATUS IN ARSENIC SOLUTIONS OF VARIOUS STRENGTHS
Number of ova laid per tick.
Percentage of ova viable.
Percentage of ticks dead after 7 days.
Percentage of ticks ovipositing.
Usual dip strength
AVERAGE NUMBER OVA PER TICK.
PERCENTAGES OF TICKS DEAD, OVIPOSITING & OVA VIABLE.
STRENGTH OF ARSENIOUS OXIDE SOLUTIONS.
0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50

FIGURE 1.

While the results show some differences between the figures for ticks from various properties, these are in part attributable to other factors such as the degree of engorgement of the ticks used. It was not possible in some cases to obtain uniform sizes of ticks, and in some cases females which were only partly engorged were included in groups. This results in a smaller number of eggs laid and also in different percentage dead after seven days. Groups I and III were most noteworthy in this respect. Another factor influencing kill was the time elapsing between the removal of the tick from the animal and its dipping in the laboratory. The strength of the arsenious oxide solutions was difficult to maintain. This was not appreciated at first and several batches (not included in those reported in this paper) were dipped in what transpired to be inaccurate strength solutions.

The results show some variation in the effect of arsenic on ticks. Two points stand out clearly, however:—

1. Laying of viable ova is completely inhibited by strengths of arsenious oxide as low as 0·15 per cent. Only 1 per cent. hatch occurs after dipping in 0·10 per cent.

2. At the strengths used in the usual dipping solutions eggs are laid by only approximately 25 to 30 per cent. of ticks dipped.

In the case of the South African resistant tick the figures given by Omar Cooper (1945) are given in Table V.

TABLE V: SOUTH AFRICAN FIGURES FOR "RESISTANT" TICKS

	"Non-resistant" ticks		"Resistant" ticks	
	% Laying	% Hatch	% Laying	% Hatch
0·64% arsenious oxide	1	No hatch	63	35
0·32% „ „	7	„	83	68
0·16% „ „	37	Partial hatching	95	76

It will be clearly seen that the small limits of variability encountered between ticks in Jamaica bear no relation to the great differences met with in dealing with the true arsenic resistant tick of South Africa.

Conclusions

B.H.C. and chlordane can be expected to give good control of ticks under field conditions. This action is due largely to their high toxicity for larvae.

DDT is less promising as a tickicide, as it is variable in its action. When used in combination with B.H.C., both at half the recommended strengths, it gives very good results.

Arsenious oxide solutions in strengths greater than 0·10 per cent. prevent the laying of viable eggs by *B. annulatus* (var. *microplus*). At the strengths used in dip fluids (0·20 per cent.), 45 per cent. of ticks survive and 34 per cent. lay eggs, but these do not hatch. Failures of arsenical solutions in the field are probably due to inefficient wetting for one or other reason.

Although Jamaican specimens of *B. annulatus* (var. *microplus*) show some variation in susceptibility to arsenious oxide solutions, there is no resistance comparable to that reported by South African workers in the case of *B. decoloratus*.

Standard methods for the laboratory assessment of tickicides should be laid down.

(To be continued with report of Field Trials, etc.)

TOTALISATOR SURPLUS ALLOCATIONS

The totalisator surplus for 1948 was £490,000 and the Home Secretary has approved allocation by the Racecourse Betting Control Board as under:—

£222,840 to the Racecourse Fund, for the improvement of racecourses, etc.;

£150,000 towards the cost of travelling horses to meetings;

£49,000 for the assistance of horse breeding, veterinary science, etc.;

£48,900 towards cost of administrative expenses of Jockey Club and National Hunt Committee, including the race-finish recording camera;

£19,260 for the assistance of point-to-point and bona fide Hunt meetings and Pony Racing.

The surplus distributed last year was £328,000.

International Scientific Committee for Trypanosomiasis Research

The gravity of the tsetse fly and trypanosomiasis problem in tropical Africa, and methods of combatting it were discussed by the first meeting of the International Scientific Committee for Trypanosomiasis Research in London recently. The purpose of the Committee is to review and co-ordinate the different lines of research being followed in many parts of Africa and Europe and to recommend priorities for future research. It was formed as a result of the international conference held at Brazzaville in February, 1948.

Opening the first session of the Committee's deliberations, Mr. Creech Jones, Secretary of State for the Colonies, said that attendance at meetings of the Committee had been confined to scientists directly concerned with trypanosomiasis to enable them to conduct their business as scientists and not as delegates of various governments.

Details of the field trials of the new drug antrycide were given by Dr. D. Garret Davey, who was able to answer many questions concerning its uses. An account was also given to the Committee of two new drugs against human trypanosomiasis which are in the experimental stage. In all, 20 papers were presented to the Committee, which was then able to make recommendations regarding the lines of future research and other matters, as follows.

Agreed Conclusions

I. Functions of Committee

1. The general functions of the Committee should be

(*a*) To review the work on tsetse and trypanosomiasis problems carried out by the organisations and workers concerned in laboratories and in the field ;

(*b*) To stimulate further research and discussion and to promote co-ordination between research organisations and workers in tsetse and trypanosomiasis problems in the different countries ; and

(*c*) To provide a regular opportunity, either in its regular meetings or by the appointment of sub-committees, for discussion of particular problems relating to tsetse and trypanosomiasis and for the exposition of new experiments and discoveries.

II. Constitution of Committee

2. While each country should normally be represented on the Committee by not more than two members, it should be open to the Committee to invite a Government to appoint additional co-opted members, with a maximum membership from any one country of *four*. In the view of the Committee, it is preferable that only scientists actively engaged in trypanosomiasis work should be appointed to its membership.

3. Professor J. Rodhain (Belgium), having been elected Chairman at the first meeting, remains Chairman until the next meeting. The Committee elected Medecin-General Vaucel (France) to be Deputy Chairman until the next meeting, when he would assume the Chairmanship and a new Deputy Chairman and Chairman-elect would be appointed.

III. Arrangements for Meetings

4. It should be decided at each meeting of the Committee when and where the next meeting is to take place. The arrangements for the next meeting would be the responsibility of the Chairman and Deputy Chairman of the Committee and of the Government of the host country, but the permanent Secretariat of the Committee should remain in London. Papers for circulation and discussion at a meeting of the Committee should reach the Secretary *not less than one month* before the Meeting is due to begin.

IV. Liaison with Standing Trypanosomiasis Bureau at Leopoldville, Brazzaville

5. The International Scientific Committee should have no responsibility for the running of the Standing Bureau.

6. The Standing Trypanosomiasis Bureau should send regularly to the International Scientific Committee all the information and publications which it is responsible for centralising and distributing.

7. Reciprocally, the International Scientific Committee should send the conclusions and recommendations of its periodical meetings to the Standing Bureau which should circulate them to the participating countries, and also to all the organisations interested in the fight against trypanosomiasis.

V. Facilities for Joint Research

8. The Committee took note with great satisfaction of Colonel Mulligan's intention to provide living and working accommodation for visiting scientists at the West African Institute for Trypanosomiasis Research in Northern Nigeria and expressed the hope that it would become the practice for scientists engaged in trypanosomiasis research to visit each others' laboratories, where such facilities exist, not only for short visits but also for longer periods of attachment for the joint pursuit of research projects.

VI. Entomology

9. The Committee strongly recommended that an extensive investigation be made into the different means of transmission of trypanosomiasis by vectors other than the tsetse fly.

10. An up-to-date monograph of African Tabanidae, particularly of Haematopota, is urgently required. The Committee recommended that the Director of the British Museum (Natural History) should be approached with a request to have this work carried out if possible.

11. The Committee heard with interest and appreciation of the attempt being made in Zululand and the adjacent area of Swaziland to achieve eradication of tsetse from an area of some 7,000 square miles by means of aerial spraying of D.D.T., and expressed the hope that the very encouraging measure of success already achieved will be maintained until final success is achieved. The Committee hoped that the Division of Entomology of the Department of Agriculture, Union of South Africa, would publish provisional lists of those insects which were killed, and of those which were not killed, by D.D.T. sprays and smokes. Even imperfect lists based only on approximate identifications would be of considerable topical interest.

12. The Committee emphasised the importance of the Jackson method of estimating the density of fly populations and recommended its extended use in preference to the present fly-round technique. It may be difficult, however, to apply the Jackson method where fly density is very low, and in such cases the importance of the association of bait animals was stressed.

13. The Committee was impressed by the results obtained by bush clearing combined with human resettlement, and planned land utilisation, of which Anchau is a notable example. This method of fly eradication is recommended for use in Savannah areas where there is population pressure.

14. Among the problems relating to the tsetse fly and its power to transmit trypanosomes which need to be further studied, the effect of temperature, moisture, microclimate and the nutritional state before and after the infective feed should not be lost sight of. The same can be said of the sterilising effect upon *Glossina* of drugs used for treatment of prophylaxis in men and animals. Research into substances circulating in the blood of animals, capable of killing *Glossina*, should also receive attention.

VII. Protozoology

15. The Committee emphasised the importance of the study of different strains of the same species of trypanosome in animals and in flies. The Committee noted the work done recently at the Tinde laboratory in Tanganyika in the differentiation of related species and strains, and recommended that it be further developed.

16. The Committee emphasised that there is still insufficient knowledge of the animal reservoirs, particularly of *T. gambiense* and *T. rhodesiense*, and strongly recommended that the study of this subject be pursued.

VIII. Chemotherapy

17. In view of the very important work being done on prevention by chemotherapeutic means, the Committee recorded its opinion that immediate research be undertaken on the relationship of immunity phenomena in connection with chemoprophylaxis in trypanosomiasis of man and animals.

18. The Committee noted with great satisfaction the development of the new drug " Antrycide " whose curative and preventive properties in animal trypanosomiasis appear to be highly promising. However, though experiments so far carried out are very promising, there has not yet been sufficient time, or observation on a sufficient number of cattle, for a final judgment to be made on the real value of the drug. The Committee therefore recommended that experiments be continued and followed up in all the regions of Africa in which trypanosomiasis is found. The Committee learned with pleasure that adequate quantities of the drug are available to African Governments for trials to be extended and completed.

19. The Committee recommended the extended study of the new varieties of arsenicals, Melarsen, Melarsen Oxide and Mel Bal which may represent real progress in the cure of human sleeping sickness. The prophylactic action of the antimonial compound MSb which is remarkable in small laboratory animals should be systematically studied in man.

IX. General

20. The Committee expresses the wish that agricultural research, particularly that directed towards the improvement of human and animal nutrition, be intimately associated wih anti-trypanosomiasis work.

THE VETERINARY RECORD

April 16th, 1949

CONTROL OF TRYPANOSOMIASIS IN AFRICA

PROBABLY the greatest single problem facing veterinarians working in territories where tsetse fly abounds is trypanosomiasis. Stockowners, even the most backward, avoid the more heavily infested belts but do not always appreciate the risks run with the adjoining areas where tsetse flies exist only in small numbers. The temptation to graze these areas during the dry seasons when pasturage is scarce, is often irresistible. The amount of grazing thus denied to stock by both the infested and adjacent areas is really enormous. Two-thirds of Northern Rhodesia, for example, is tsetse infested. Eradication of the fly is ultimately the only means of preventing the occurrence of trypanosomiasis in stock and man, for while there are "carriers" the danger of re-infection of susceptible stock is ever imminent, no matter how excellent may be the remedial or preventive treatment devised. Until this is possible, therapeutic or preventive treatment of susceptible cattle appears to be the only hope for establishing, alternatively, some degree of effective control. About 1912, Hornby, the value of whose life-work in the intimate study of this menace can never be over-estimated, treated cattle in the infested areas in Northern Rhodesia with tartar emetic, then the most reliable agent known against *T. congolense* infection. The numbers from whose blood the parasites disappeared varied greatly, and, as is well known, the prophylactic action of this drug is of very short duration. Some years later, when copper mining was undertaken in large areas within the territory, oxen were used to transport all the material during the developmental phase and these oxen were protected by injecting them with tartar emetic every five days. It is surprising that this great achievement, for such it was, resulting from Hornby's original work, failed then, as it has done since, to receive its due measure of appreciation.

Since then, various complex chemical compounds have become available and have been given extensive trials. The field results with a few of them, notably some members of the phenanthridinium series, have been promising. Two of this series, in particular, designated respectively as phenanthridinium 897 and 1553, have been given extended trials which have proved that they were a definite advance upon all drugs previously used. Phenanthridinium 1553 is almost 100 per cent. effective in treatment, its drawback being that a small incidence of delayed toxicity occurs even with therapeutic doses, while in some circumstances the use of these agents produces other untoward sequelae such as photosynthesis. Extensive use was made of them with such satisfactory results that two million doses were called for from Africa in 1948.

In January of this year, the Colonial Office and Imperial Chemical Industries announced that trials with a new synthetic compound, named antrycide, had been successful. In at least two important respects this drug portends to be a real advance, in so far as it appears to be remarkably safe and its prophylactic action of long duration. The manner of the announcement, however, was most unfortunate for it caused the lay Press to publish statements which might lead the uninitiated to believe that the problem of trypanosomiasis in stock had been solved, and the real menace of the vector somehow diminished. Brief details that have been disclosed by the manufacturers, received publication in our issue of March 19th, and indicate the results of the trials to date. The results of the further experiments now being made may well give cause, as we hope, for increased satisfaction.

So long as tsetse fly remain, so long will trypanosomiasis menace stock. To be completely effective in control, the therapeutic reagent required must clear the blood of virtually all animals infected with any species of trypanosome. It must also protect the "cured" as well as the non-infected over a reasonably long period. The task of injecting the millions of cattle which are exposed to risk is an enormous one and could not be undertaken at frequent intervals. By no means has the time arrived when the average African stockowner can be entrusted with the inoculation of his own animals and the task consequently must fall upon the already overburdened veterinary departments. The rate of progress is quickening and there is a possibility that the time is not far distant when trypanosomiasis can be *controlled*. But mere control, in itself, is insufficient. The means of eradicating the fly itself must be found. Until then, the menace may be checked, but it is *not* suppressed.

21. Dr. G. Stuart, representing the World Health Organisation, informed the Committee that this Organisation would be prepared to consider requests for assistance in connection with specific research proposals. It was decided that this question should be placed on the agenda of the next meeting of the Committee.

22. The Committee was impressed by the necessity for research directed towards determining the criteria by which complete freedom from infection can be accepted, since this is fundamental to the proper assessment of the value of drugs in the treatment and prophylaxis of trypanosome infections.

23. The Committee invited the Belgian Government to convene the next meeting of the Committee in June, 1950.

CURRICULUM FOR ADMISSION TO THE VETERINARY COURSE AT ALABAMA

Many of our readers will be interested in the following description of the curriculum for admission to the course in Veterinary Medicine at the School in Auburn, Alabama, forwarded by Mr. F. H. Manley, M.V.SC. (LIV.), M.R.C.V.S., Professor in the Department of Bacteriology and Pathology. Interesting requirements are the Animal Nutrition, Poultry Husbandry and Types and Breeds courses. Students do not come under the jurisdiction of the Dean of the School of Veterinary Medicine until they have completed the two years of pre-veterinary training and are ready to commence the subjects of Anatomy and Physiology.

All applicants for admission to the School of Veterinary Medicine in the Fall of 1949 must have completed an approved two-year curriculum in an accredited college consisting of approximately ten quarter-hours* of inorganic and five of organic chemistry; ten quarter-hours each of zoology and botany; ten quarter-hours of English; five quarters each of college algebra, trigonometry and physics; five quarter-hours each of animal types and breeds, livestock management and poultry husbandry; five quarter-hours each of American history and medical vocabulary; and five quarter-hours elected from any of the following: public speaking, introduction to business, principles of economics, introduction to accounting or book-keeping, regional geography, or American government. Ten quarter-hours of Latin or modern language may be substituted for medical vocabulary and the electives. Where credits have been obtained in semester hours, a three semester hour course will be accepted as the equivalent of a five quarter-hour course. Completion of the work required for a Bachelor of Science degree in Agriculture will be considered as fulfilling the requirements for admission.

* A subject designated as a five quarter-hour would mean a course of five lecture hours or three lecture and four laboratory hours per week for a term. If a student has four such subjects in a term, he is said to carry a load of 20 hours for that term, that is, four five-hour-a-week subjects.

CLINICAL COMMUNICATION

A Case of Suspected Poisoning of Geese, Possibly Caused by the Feeding of Wet Brewers' Grains

A. M. McCALLUM

and

J. D. BLAXLAND,

VETERINARY LABORATORY,

MINISTRY OF AGRICULTURE, WEYBRIDGE

A search of the literature has failed to reveal any reports of poisoning associated with the feeding of wet brewers' grains to farm animals or poultry. The following account of suspected poisoning in geese is therefore presented, although it is recognised that the evidence is almost entirely circumstantial.

HISTORY

The geese, numbering 70, were owned by a large firm of brewers. The birds were in contact with about eighty hens and ten ducks. Geese, ducks and hens received the same food, which consisted of swill from the workers' canteen, crushed oats and wet brewers' grains. The latter was obtained fresh every day from the adjacent brewery. Owing to a shortage of other foods, the wet grain content of the feed had been gradually increased during the previous month, until 25 per cent. or more was being fed.

On the Sunday evening of August Bank Holiday week-end, one goose was found dead. An hour or two later two more birds were sick, showing symptoms of ataxia. By Monday, they also were dead, and a large number of the flock was affected, all showing similar symptoms. Thirty geese were dead by Wednesday (August 5th), and some of these, together with eleven affected geese, were brought to the laboratory. The premises were visited the same afternoon.

SYMPTOMS

The most striking feature was the peculiar stance adopted by affected birds; the neck was arched, with the beak just touching the ground; some appeared to be blind, and, when forced to walk, they stumbled into any obstacle in their path. They moved with a staggering gait, maintaining their balance with difficulty, and trailing their wings as if partially paralysed. The vent feathers of many were soiled, suggesting diarrhoea. A number of the birds appeared completely paralysed, lying on their sides unable to move; if placed on their feet, they immediately "flopped over" when support was removed. A few were comatose and the attendant reported that death followed this stage fairly rapidly. He indicated some which he believed were recovering and, although they still trailed their wings, they walked more steadily and did not blunder into obstacles. About ten of the geese were unaffected.

All ducks and hens were apparently healthy and had never shown any of the symptoms noticed in the geese. All but four of the live geese received at the laboratory recovered eventually, but it was almost a week before they appeared completely normal. The trailing of the wing was the last symptom to disappear.

POST-MORTEM EXAMINATION

The dead geese were all in excellent bodily condition, and there were no diagnostic *post-mortem* lesions. In some cases the livers were dark and congested and there was slight congestion of the lungs, in a few the myocardium showed petechial haemorrhages. The most consistent lesion was an intense haemorrhagic enteritis, with a considerable quantity of undigested food throughout the intestinal tract.

Smears of heart blood stained by Leishman's method did not reveal any organisms. Cultural examinations proved completely negative.

POSSIBLE CAUSE OF THE CONDITION

In the normal way grains are removed before the fermentation of the malt is commenced and fresh brewers' grains contain no injurious fermentation products. If, however, they become contaminated with bacteria and yeast, either brewers' yeast or wild yeasts, and are left in the wet state for a considerable length of time, an abnormal type of mixed bacterial and alcoholic fermentation can occur. The resultant product may contain a mixture of alcohols causing symptoms of intoxication, together with products of bacterial fermentation capable of causing death.

In an attempt to reproduce similar symptoms, a sackful of wet grains was obtained from the brewery, but laboratory birds could not be induced to eat it. A healthy goose was also dosed with ordinary alcohol diluted with saline. Quantities equivalent to 2 c.c.s of absolute alcohol were without effect, but when the dosage was raised to 7 c.c.s symptoms of intoxication appeared within 10 minutes. The bird maintained its balance with difficulty, impaired vision was indicated by stumbling into obstacles in its path and its general behaviour resembled that of the less severely affected brewery geese. The symptoms, however, passed off in 20 minutes, leaving the bird quite normal.

The protracted symptoms of the brewery geese, followed by high mortality, suggest an abnormal fermentation associated with toxin production rather than simple alcoholic effects. It is suggested that owing to the holiday period and shortage of staff a particular batch of wet grains was exposed to abnormal conditions and that this batch was the cause of the trouble.

No satisfactory explanation can be given for the apparent immunity of the ducks and hens, which were stated to have received the same food as the affected geese.

Acknowledgments are due to members of the Biochemistry Department for their assistance and for information which supported the suggestion presented in this note as to the cause of the condition described in the geese.

ABSTRACTS

[Motility of Bovine Spermatozoa. RAO, C. K., & HART, G. H. (1948.) *Amer. J. vet. Res.* **9**, 286.]

In this extremely interesting article the authors discuss the factors which initiate motility in spermatozoa, the mechanism and types of motility and the evaluation of this property in relation to fertility.

Motility is an early characteristic of the developing sperm which are kept in a state of anabiosis by environmental factors, mainly the low electrolyte content of the epididymides, viscosity of the medium, low temperature in the scrotum and space limitations. Sperm motility normally is initiated in the ampullae, and the violent activity of the ejaculated sperm is actually the end result of a series of functions which synchronize harmoniously at the time of ejaculation.

The movement appears to be initiated in the sperm tail, the head acting as a rudder. Tails have been seen to move independently of heads, though this movement was aimless and weak. After proceeding actively in a linear direction, healthy sperm ultimately slow down, show convulsive movements and come to rest rather abruptly. Spasmodic movements stimulated by passing sperm can be observed. Though immobile, death does not take place immediately, however, when movement ceases.

When motility of bull sperm has ceased under normal conditions of storage, it may be activated by the addition of isotonic salt or glucose solution.

The approximate rate of movement in millimeters per minute has been reported as follows: stallion 5·2, bull 4·02, ram 3·00, dog 2·58. Vigorous shaking of bull semen for three minutes destroyed motility.

As to the types of motility—the sperm will, during maximal motility, move in a straight line, with the head on-edge. As it becomes weaker it tends to roll on to the flat side. Alternation of position is characteristic of second grade activity.

Subsequently the sperm come to lie flat. If the connecting piece is bent, movement may be in a semi-circular fashion along a circumference dictated by the bent piece (motility in a circular direction, even if vigorous, is abnormal). If there is a complete looping of the tail slight vibration or even circular movements, may be observed. Finally, declining vigour is indicated by convulsive movement unassociated with progression. From the point of view of fertilisation it would seem that lack of motility does not necessarily indicate incapacity to fertilise although weakness in this direction impedes progress towards the ovum. Despite criticism, the authors feel that motility is still a criterion of considerable importance when assessing the fertilising qualities of semen.

Testing the effects of dilution, the authors found that motility was not impaired at a dilution of 1:400 with egg-white buffer, but when saline was used most of the sperms were immobile after two hours. This supports the observation of Salisbury (quoted in the article) that fertility is not impaired by diluting 1:100 by egg-white buffer—incidentally, a dilution much greater than that likely to be employed under prevailing conditions of A.I.

N. S. B.

[The Control of Ovine Enterotoxaemia by the Use of *Clostridium perfringens* Type D Bacterin. Baldwin, E. M., Frederick, L. O., and Ray, J. D. (1948.) *Amer. J. vet. Res.* **9**, 296.]

The author has shown that alum-precipitated *Clostridium perfringens* (*Cl. welchii*) Type D bacterin is effective in the control of ovine enterotoxaemia.

Experiments were carried out in 1946 and 1947. In the 1947 experiment, 1,967 lambs were injected with bacterin (5 c.c. dose) and 960 of these were given a second dose two weeks later. Controls numbered 1,970. The lambs were force fed, but this was discontinued in the case of the control animals when it was obvious that to continue would result in undue loss.

Post-mortem lesions indicated 74 deaths due to enterotoxaemia but only 69 (66 controls plus three immunised) of those were confirmed in the laboratory. (Only those cases in which Type D toxin was demonstrated by i/v injection of Swiss mice with filtrate from intestinal contents were taken as positive.)

Antitoxin determinations of serum at 30, 60 and 62 days after the first injection showed that the immunised lambs of both the one and two dose groups were resistant to the Type D toxin, *i.e.*, a degree of protection is produced for at least 62 days after injection of bacterin. Two doses produce a higher antitoxin level than one dose, but one dose probably provides sufficient protection for three months.

Combining power values of the bacterin were worked out.

The most constant finding on *post-mortem* examination was cardiac haemorrhages the size and location of which varied considerably.

Transient post-vaccinal lameness is recorded.

S. J.

* * * * *

[Cutaneous Erysipelothrix Infection in Sheep. Whitten, L. K., *et al.* (1948.) *Aust. vet. J.* **24**, 157-163.]

Outbreaks of lameness following dipping in derris and benzene hexachloride dips have been investigated. In all cases the dip was foul and had been standing for some time. Lameness was found to be due to secondary involvement of the laminae following infection of skin abrasions by *E. rhusiopathiae*.

The condition is prevented by the addition of copper sulphate to the infected dip.

S. J.

REVIEW

[Topographical Anatomy of the Dog. By O. Charnock Bradley, revised by T. Grahame. xii+319. Oliver and Boyd, Edinburgh. Fifth edition. (1948.) 30s. net.]

In preparing the fifth edition of Bradley's well known book, Professor Grahame has taken the opportunity to add to the number of radiograph plates. In previous editions Grahame had introduced this important link with dissection studies and the figures illustrating the position of stomach and large intestine after a bismuth meal are further examples of the value of this form of instruction. The plate illustrating a dissection of the head showing temporary and permanent dentition as another welcome addition.

In his preface Professor Grahame explains that it has been his endeavour to restrict the contents to that of a reasonably good guide to the dissection of the dog, and there is, therefore, little change in the text apart from a few more paragraphs on the mammary and adrenal glands. As such it remains a guide book of extreme value; but it is to be hoped that at some future date Grahame and his school may be persuaded to attempt a more comprehensive volume on the anatomy of the dog in the English language and so fulfil a long-felt need.

REPORT

[Report of Director, Abattoir and Livestock Market Department, City of Johannesburg, for Year ending June 30th, 1948.]

During the year the Department was two veterinarians under strength, the total professional staff amounting to four, including the Director and his assistant. A total of 776,258 animals were slaughtered, including 296,166 head of cattle, 194,705 sheep, and 122,987 pigs. The total amount of meat and offal condemned was approximately 1,974 tons; 186 cow carcases and 403 pig carcases were condemned on account of tuberculosis. Extensive bruising resulted in the loss of 63,148 lb. of beef and 2,089 lb. of pork.

G. P. W.

Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Granular Vaginitis

Q. CCXCV.—*What is known regarding the cause, effects and treatment of granular vaginitis? Do the experts agree with the view that this condition can occur without being responsible for sterility? Is it an ascending or descending infection, and has any work been carried out to investigate the possibility of its being transmitted by coitus, some authorities having suggested that the bull is infected by a similar nodular balano-posthitis?*

A.—In the opinion of the respondent so-called granular vaginitis is not in itself a pathological condition. The nodules consist of lymphadenoid tissue and under certain conditions they become temporarily congested and prominent. This can occur when there is some infection of the genital tract, but in the writer's opinion so-called granular vaginitis is not invariably associated with bacterial infection, and may occur during certain stages of pregnancy.

The Protection of Suckling Calves Against White Scour

Q. CCXCVI.—*Is it possible, by the use of vaccines, or in any other way, to raise the antibody content of cow's milk in order to protect suckling calves from white scour?*

A.—Colostrum contains antibodies to *Bact. coli* which are in the vicinity; different antigenic strains of *Bact. coli* are involved in white scour. Therefore, vaccination is impracticable. The best advice that can be tendered, and advice which will certainly give a result, is to concentrate on good calf management on the lines laid down in the N.V.M.A. publication "Husbandry and Diseases of Calves."

Alopecia in Castrated Male Cat

Q. CCXCVII.—*What is the cause of loss of coat on the limbs and under the abdomen in a castrated male cat? There appears to be slight irritation but no lesion of the skin itself and no parasites are visible to the naked eye. The cat is four years old, in good condition and leads an active life.*

A.—The condition described in this question is a very common one in cats, particularly of recent years. The case quoted is apparently mild at present and should respond well to treatment. The writer describes this condition as a dietetic dermatitis and believes it to be due primarily to a deficiency of biotin (vitamin H) in present-day diets. Natural sources of biotin include liver and milk, and as the vitamin is water soluble it is in its highest concentration in uncooked and unheated food. Rational treatment would be the provision of raw liver as a regular feature of the diet, but this is rarely possible in present circumstances. Biotin must, therefore, be prescribed in therapeutic form, and the product suggested is Murnil (Bayer), a minimum of one teaspoonful daily being administered in the food in which form it is willingly taken by most cats. This line of treatment was introduced to the writer by C. G. Hopson, M.R.C.V.S., and undoubtedly gives better results than any other. Local treatment is rarely necessary in mild cases, but a mild stimulating dressing such as Whitfield's ointment (ung. ac. benz. co.) is useful in some cases.

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Correspondence

Umbilical Hernia in the Foal (Q. CCLXXXIII)

Sir,—My experience agrees with that of Mr. G. P. Male as to the value of a truss in the treatment of the above condition in sucking foals.

I am indebted to the late Mr. J. M. Jameson, M.R.C.V.S., of Derby, for introducing me to a most excellent truss—made by an Ashbourne saddler—who is unfortunately no longer in business. It was probably first made to the specification of one of the Ashbourne veterinary surgeons of that day. It consists of a canvas belly piece to which is built up in the centre of the posterior edge a pad made up of about four pieces of thick felt. The thickness of the pad at the posterior edge is approximately 2½ inches, tapering forwards so that the thickness of the anterior edge is approximately half an inch, and the edges are bevelled to prevent chafing.

The belly piece is supported each side by three straps made with double thickness inner motor tyre tubing with leather at the ends. These pass over the back and are attached by buckles to the other

side. There is also a light breast strap to keep the whole in position.

My experience is that after the first hour or two foals are quite oblivious to its presence. Naturally the foal requires to be kept under observation and adjustments made to prevent chafing, although I have known them worn for weeks with very little attention.

Whether the result is due to the pressure, the irritation or both, I do not know, but correctly applied and worn for several weeks the outcome invariably is successful. The elasticity of the rubber tubing is, I think, the secret of success of this particular truss.

Unfortunately I have not an original but the measurement of the canvas of the one I have in use is 27 × 17 inches, and the bottom piece of felt 9 × 6 inches.

Yours faithfully,

Acle, Norwich. O. V. GUNNING.

March 27th, 1949.

QUESTIONS IN PARLIAMENT

Bovine Tuberculosis (Consultations)

Mr. HURD (Apr. 4th) asked the Minister of Agriculture if he has completed his consultations with the farming organisations and the veterinary profession on the arrangements to be made for the systematic eradication of bovine tuberculosis and the establishment of clean areas; and when he will put such a scheme into operation.

THE MINISTER OF AGRICULTURE (Mr. THOMAS WILLIAMS): No, Sir. While discussions with the interests concerned show that there are no wide differences of view as to the main principles on which an area eradication plan should be based, a few difficult questions remain as regards the financial provision of such a plan. I hope, however, that these may be resolved in the near future. Meanwhile, substantial progress continues to be made under the voluntary Tuberculosis (Attested Herds) Scheme, which now includes nearly a million and a half cattle.

Mr. HURD: Is the Minister remembering that these consultations have gone on for very many months; and does he not agree that to get an effective scheme for eradicating bovine tuberculosis we must have co-ordination which can only be done through his Department?

Mr. WILLIAMS: I fully appreciate that, and I hope the hon. Member will not forget the evidence side of determining an eradication area.

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Foot-and-Mouth Disease (Serum)

Mr. DE LA BERE (Apr. 4th) asked the Minister of Agriculture whether he will consider making experiments in this country with the treatment of foot-and-mouth disease by a serum vaccination in view of the success achieved by the French Ministry of Agriculture.

Mr. T. WILLIAMS: Tests with serum have been carried out in this country and its value in controlling outbreaks of foot-and-mouth disease is well understood. The use of the serum would not, however, be entirely effective in preventing outbreaks or the spread of the disease, and I am satisfied that the present eradication policy is the best and most economical in the circumstances of this country.

Mr. DE LA BERE: Can we have an assurance from the Minister that research will be made into this all-important matter, in view of success that has attended this treatment in France?

Mr. WILLIAMS: Perhaps it would not be out of place if I were to tell the House that the success achieved by the French Ministry of Agriculture may be measured by the fact that during January, 1949—the last month for which we have figures—there were 1,773 outbreaks of foot-and-mouth disease in France; in this country, we have had 24 outbreaks in the last 15 months.

Mr. M. PHILIPS PRICE: Is it not possible for farmers to get hold of this serum so that they can try it out voluntarily?

Mr. WILLIAMS: I should want notice of that question.

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Ewes and Sows (Slaughter)

Mr. MAINWARING (Apr. 4th) asked the Minister of Food the number of ewes in lamb slaughtered during the month of March, and the consequent loss in the potential meat supply of the nation.

Mr. STRACHEY: I am afraid we could only obtain this information by extensive and costly enquiry.

Mr. MAINWARING then asked the Minister of Food what instructions are issued with regard to the possible slaughter of ewes in lamb and sows in pig; and to what extent meat inspectors are authorised to deal with this question.

Mr. STRACHEY: As to ewes, I would refer my hon. Friend to the replies given to the hon. Member for the Ayr Burghs (Sir T. Moore) on February 23rd and March 21st. I am afraid it has been found impracticable to apply the same instructions to pregnant sows. Meat Inspectors are only authorised to decide the question whether a carcase is fit for human consumption.

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Advisory Council for Wales

Sir HENRY MORRIS-JONES (April 6th) asked the Prime Minister whether he is now able to announce the names of the chairman and members of the proposed Advisory Council for Wales.

THE PRIME MINISTER (Mr. ATTLEE): The composition of the Council has not been finally settled, but I hope to be able to announce the names shortly.

Sir H. MORRIS-JONES: Will the right hon. Gentleman appoint, as chairman of this body, a person of some eminence in Wales who has not been associated with party politics, in view of the fact that the setting up of this body has not been well received in the Principality?

THE PRIME MINISTER: The qualifications of the person to be selected as chairman will be taken into account.

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Pigs (Slaughter)

Mr. W. ROBERTS (April 6th) asked the Minister of Food whether he will make it a condition of issuing licences for the slaughter of pigs under the self suppliers' scheme that the pigs are slaughtered with the use of a humane killer.

Dr. SUMMERSKILL: I have great sympathy with the hon. Gentleman on this question, but I regret that it would be impracticable to make the use of a humane killer a condition for the grant of a slaughtering licence for a pig for home consumption, since a large number of these pigs are killed on remote farms. In any case it would be impossible to enforce such a requirement.

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Common Cold (Research)

Sir RALPH GLYN (April 6th) asked the Lord President of the Council whether he is now in a position to report on the progress made in the investigation of the causes that produce the common cold which have been carried out for some time by the Medical Research Council establishment at Salisbury.

Mr. H. MORRISON: The researches at Salisbury, promoted by the Medical Research Council with the co-operation of the Ministry of Health, are adding steadily to knowledge of various aspects of the common cold, though the nature of the problem is such that rapid progress cannot be expected. The fact that it has been found possible to transmit the infection to human volunteers, in some 60 per cent. of cases, by means of filtered nasal washings from people with colds strongly indicates that the cause is a virus.

The Development Commissioners, in association with the Ministry of Agriculture and Fisheries and the Scottish Home Department, offer post-graduate training grants of £220-£300 per year, tenable from October 1st, 1949, for training men and women in the investigation of problems in marine and freshwater science. The grants (about five in number) are open to honours graduates in science of a British university, and are tenable for one year with renewal up to a maximum of three years. Forms of application (to be returned by May 1st) and full details may be obtained from the Secretary, Development Commission, 6a, Dean's Yard, Westminster, London, S.W.1.

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Weekly Wisdom

"*This disease like its congeners is not a spontaneous creation of the economy. It is not debility, nor fatigue, nor misery, nor cold, nor heat, etc., which can make it spring up in the organism. For its birth, a germ is necessary which can only come in from without, and its inoculability demonstrates that this germ multiplies itself and perpetuates itself in the organic media of men and certain animals*" (page 620). . . . "*We modify smallpox by vaccinia and give an artificial immunity against the virus of smallpox; is it forbidden us to hope that the tuberculous virus will some day reveal its antagonistic substance? And how immense would be the results from a neutralising agent, applied in the beginning of the disease, and destroying in the organism the morbid principle which there multiplies itself!*" (pages 630-31).—VILLEMIN (1868). Quoted in "Development of Our Knowledge of Tuberculosis," by L. F. Flick.

NOTES AND NEWS

Diary of Events

Apr. 20th.—Special Meeting of the Society of Women Veterinary Surgeons Division, N.V.M.A., at the Royal Veterinary College, London, N.W.1., 7.30 p.m.

Apr. 20th.—Meeting of the Lincolnshire and District Division, N.V.M.A., at Peterborough (Grand Hotel), 2.15 p.m.

Apr. 20th, 21st and 22nd.—Quarterly Meetings of Committees and Council, N.V.M.A., in London (Meeting of Council, April 22nd).

Apr. 21st.—Extraordinary General Meeting of the Royal Counties Division, N.V.M.A., at the Geology Lecture Theatre, The University, Reading, 4 p.m. (Note change in time of meeting.)

Apr. 21st.—Annual Race for the R.A.V.C. Point-to-Point Challenge Cup, at Melton Mowbray (Quorn Hunt Meeting).

Apr. 21st.—Meeting of the Association of Veterinary Teachers and Research Workers, at the Royal Veterinary College, London, N.W.1, 11 a.m.

Apr. 23rd.—Association of State Veterinary Officers: Annual Meeting at the Royal Veterinary College, Camden Town, 2 p.m.; Annual Dinner at the Criterion Restaurant, Piccadilly, 6.30 p.m.

Apr. 27th.—Meeting of the Mid-West Division, N.V.M.A., at Bristol (Berkeley Café, Clifton), 2.15 p.m.

Apr. 27th.—Meeting of the East Midlands Division, N.V.M.A., at Sutton Bonington, 2.15 p.m.

Apr. 27th.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton (Polygon Hotel), 6 p.m.

Apr. 28th.—Special Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, 2 p.m.

Apr. 28th.—Meeting of the South-Eastern Division, N.V.M.A., at Tunbridge Wells (Mount Ephraim Hotel), 2.30 p.m.

Apr. 29th.—Meeting of the Yorkshire Division, N.V.M.A., at York (Royal Station Hotel), 2.30 p.m.

Apr. 29th.—Extraordinary Meeting of the Midland Counties Division, N.V.M.A., at Birmingham (Grand Hotel), 2.30 p.m.

May 3rd.—R.C.V.S. Animal Management Examination tour, commencing with London.

May 16th.—R.C.V.S. Pharmacology, etc., Examination (Revised Syllabus). Written, 10 to 12 noon, at appropriate Colleges.

May 16th.—Annual Meeting of the R.A.V.C. Golfing Society, at North Hants Golf Club, Fleet, 10 a.m.

June 1st (Wednesday).—Annual General Meeting of the Royal College of Veterinary Surgeons.

June 1st, 2nd and 3rd.—Quarterly Meetings of Council, R.C.V.S.

June 7th and 8th.—D.V.S.M. Written Examination, Royal (Dick) Veterinary College, Edinburgh.

June 23rd and 24th.—R.C.V.S. Membership Written Examination.

Aug. 8th to 13th.—Fourteenth International Veterinary Congress, Central Hall, Westminster, and Church House, Westminster, London, S.W.1.

Aug. 12th to 15th.—Sixty-seventh Annual General Meeting and Congress, N.V.M.A., in London.

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The Late Major G. E. Oxspring, O.B.E., F.R.C.V.S.

Major George Ernest Oxspring, who, as we recorded with deep regret in our last issue, died on April 5th last, went almost immediately into the army after qualifying in 1915, his distinguished career in the R.A.V.C. being outlined in the tribute which we publish below from Brigadier Plunkett. At the time he left the army Major Oxspring was in charge of the laboratory at Aldershot, and during his service at home had created great interest by his investigations with the X-ray examination of the horse's foot. He examined in Surgery for the R.C.V.S. for several years, and a moving tribute was paid to him by the President, Mr. Dawes, at last week's meeting of Council of the Royal College. In 1936 he went to Ashford in Kent and took over a practice which he developed with considerable success. He was very popular with his clients, particularly horse owners, taking an active interest in the local Hunts. Mr. A. J. Beeson, the Secretary of the South-Eastern Veterinary Association, recalls that Major Oxspring joined that society in 1937 and was a regular attendant at the meetings, taking an active part and interest in the discussions. He was President in the years 1943 to 1945: "A man of the strictest integrity and of a very pleasant character, he will be sadly missed."

Tributes

Brigadier J. J. Plunkett, C.B.E., Director, Army Veterinary and Remount Services, writes:

Major G. E. Oxspring, O.B.E., F.R.C.V.S., will be mourned throughout the veterinary profession and the ranks of the R.A.V.C.

He was a very distinguished and a very honoured member of his profession and of his corps in the army. He served from 1915 to 1937, and was on active service in the first world war, during which he was Mentioned in Despatches and awarded the O.B.E. After the war he served in the Sudan, Egypt, China and India and the U.K. and held various responsible appointments, always with credit.

We of the R.A.V.C. who have served with him are well aware of all the sterling qualities which made the man so great, and of the wonderful professional ability which he possessed and applied with the greatest zeal at all times.

He was unfortunate enough to suffer bereavement during the late war by the loss of his first wife and his only son while on active service, but as a patriotic Briton he carried on relentlessly, and even when not very fit was always prepared to put duty and the love of his profession first.

We send our deepest sympathy to his widow in her bereavement.

Dr. J. T. Edwards writes:

I had known Major Oxspring—or "Oxo" as he was affectionately called by his many friends in the army—since his student days, and, in one way and another our paths have often crossed since those happy times when the prospects for decent and earnest young men, such as he was, were so different from what they are now. They little suspected, after what seemed to be a state of established peace in the world, that a cataclysm was soon to break which, if it did not shatter, would deflect entirely, the careers of young men from their original plans. And so it was that the call of the army came to compel most of the younger veterinary graduates to take commissions in the R.A.V.C. It was the horse that remained the prime motive power in that war, though towards the end there were many murmurings of impending change. However, a service which offered prospects of reaching high rank and power seemed alluring indeed when compared especially with the toil of those days in general practice. Hence many of our finest graduates were lured, after the end of the 1914-18 war, to stay on in the army. Oxspring was one of them, for as we can now well see, he would have graced the staff of any of the veterinary schools as a clinical teacher. Then, with the neglect of the army generally and the dwindling of what had augured well to be a fine corps—many again of those men, in the '30's, became so depressed with the prospects that they left the army, to chance their luck, before it was too late, in general practice, and again Oxspring was one of them. I recall the time very well. He was then in charge of the Army Veterinary School at Aldershot, and was busying himself with the founding of the *Journal of the Royal Army Veterinary Corps*, which has since become one of the liveliest and most interesting veterinary periodicals. He had, too, been much concerned with developments in X-ray diagnosis as applied to the horse, and many readers will recollect his interesting demonstrations at the N.V.M.A. Congress held at Edinburgh in 1934. I think he himself would have been content to stay on in the army, pursuing his researches, because although socially he was acceptable everywhere he was not ambitious that way and a quiet life using all the facilities afforded him by a veterinary career in the army for clinical research would have suited him well. However, his wife, to whom he was devoted, had always been a semi-invalid and she was ambitious in the matter of ensuring that nothing should be denied their only son in the shape of a first class education. So Oxspring left the army and set up in practice at Ashford in Kent. For the first six months or so, he told me, the readjustment necessary to fit himself to the very different strains of general practice told heavily on him. However, in that he succeeded well and found interest in the activities of the South-Eastern Counties Division and later as Examiner for the R.C.V.S., to gratify his professional zeal. But tragedy was soon to follow. He lost his son during the early months of the war when his ship was sunk, and, afterwards, he lost his first wife. When I met him again at a local divisional meeting, towards 1943, he had the appearance of a man who had swallowed the cup of bitterness to the full, but yet was determined to carry on to the end, and the happiness he found in his second marriage a few years ago is a solace to us all.

The Funeral

The funeral took place at Charing Crematorium on April 7th, when the following members of the veterinary profession were present: Major L. P. Pugh of Sevenoaks, representing the R.C.V.S., and the President and Vice-Presidents of the N.V.M.A., Major J. G. E. Gallie of Ash, President of the S.E.V.A., Messrs. A. J. Beeson, J. Stewart, J. Paterson, of the Ministry of Agriculture, P. S.

Hastie and P. R. Greenough, Major Oxspring's Assistants, Capt. F. C. Gillard and Messrs. J. Wright and C. W. Perrin of Folkestone, A. F. F. Britten of Faversham, F. A. Crowhurst of Maidstone and P. M. Sutton of Tunbridge Wells.

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PERSONAL

Births.—CENCORA.—On March 6th, 1949, at Shrublands Nursing Home, Croydon, to Vera (*née* Tanner) wife of T. Cencora, M.R.C.V.S., of 6. Brooklyn Avenue, South Norwood, S.E.15, a son, Michael Julian.

JOHNSTON.—On March 31st, 1949, at Merrivale Nursing Home, West Kirby, Wirral, to Phyllis (*née* Henderson), wife of Ronald M. Johnston, M.R.C.V.S., a son (Roderick Guy) a brother for Martin.

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LEGAL NOTES

DEATH OF BULLOCKS IN TRANSIT BY LORRY

Colchester magistrates, on March 8th, fined F. Simons, of Bradfield, Essex, £15, with £5 5s. costs, for conveying seven bullocks in such a manner and position as to cause them unnecessary suffering, and F. J. Elliott, of Badby, £10, with £3 costs, for causing them to be so conveyed.

Mr. Gordon Jones, prosecuting for the R.S.P.C.A., said on December 6th, 20 beasts were sent by road in three lorries from Daventry Collecting Centre to the Ministry of Food's abattoir at Colchester. The loading, it was alleged, was under the supervision of Elliott, who was the foreman at the market, while Simons, the driver of one of the lorries, was present when the vehicles were loaded. Simons' lorry contained seven beasts, as also did another, and the third had six beasts. Four of the seven in Simons' vehicle were black Welsh runts—big beasts—and the prosecution alleged that they were overcrowded on the 120-mile journey, which normally took five hours, but which on this occasion took nearly 11 hours.

After 30 minutes, said Mr. Jones, one of the beasts in Simons' lorry was already "down," and after another 15 miles a beast in the other vehicle containing seven, unable to endure the confinement, jumped out of the lorry and injured itself severely, causing a long delay to the convoy, and the beast had to be slaughtered. At St. Albans it was found that another beast in Simons' lorry was "down." This was got up, but at Hatfield, ten miles further on, two black beasts were also "down." At Bradwell, Simons inspected the beasts in his lorry and found that all were breathing heavily, and distressed though they were standing. This was at 10 p.m., and Simons proceeded the remaining 14 miles to Colchester. On arrival, the beasts in the two lorries each containing six, were all right, but three in Simons' lorry were dead, and two of the others were down on their knees.

Mr. C. T. Murphy, a veterinary surgeon, was called and came to the conclusion that the three had died from suffocation.

Elliott, Mr. Jones contended, had not exercised prudence in loading seven beasts of this nature in one lorry, while Simons had "warning after warning" en route, and should have pulled up at some farm and unloaded some part of his cargo.

Evidence for the prosecution was given by Mr. C. T. Murphy, M.R.C.V.S., of Colchester, who said that the floor area of the lorry in which the three Welsh Black bullocks were found dead and the others in various stages of exhaustion, was approximately 14 ft. by 7 ft. 8 in. Blood smears from the dead animals negatived anthrax and he formed the opinion that death was due to suffocation. This opinion was confirmed by *post-mortem* examination. In each case the lungs were congested with blood and there was severe and extensive bruising all over the carcases—due, in his view, to the struggles of the unfortunate beasts and the stamping and trampling by their neighbours. Analysis of organs showed that there was no evidence of any disease in the carcases.

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ASSOCIATION OF VETERINARY STUDENTS

ANNUAL CONFERENCE AT LIVERPOOL

The seventh annual conference of the Association of Veterinary Students was held at Liverpool from March 26th to 29th inclusive.

Saturday was devoted to sporting activities, as recounted below, and on Sunday, March 27th, the conference was opened officially by Mr. J. O. L. King, B.SC., M.R.C.V.S., who welcomed the students from other colleges to Liverpool and then took the future of the profession as his theme. Before the opening, there was one minute's silence in memory of A. Montefiore.

The Liverpool College paper on "Aspects of Veterinary Careers" was read by L. N. Owen and the discussion was opened by Mr. J. O. L. King. This was followed by a paper from the Royal (Dick) Veterinary College on "A Review of the Present Syllabus," read by the delegate, D. Bronagan. The discussion was opened by Mr. W. Jordan, B.SC., M.R.C.V.S.

After lunch the paper from London was read by the delegate, J. L. Crooks, on "Extramural Tuition" and the discussion was opened by Mr. H. Sumner, who told the conference many interesting facts about "seeing practice." A talk followed from Professor A. N. Worden, M.A., B.SC., M.R.C.V.S., F.I.C., on the scientific activities of the Universities Federation for Animal Welfare and an interesting discussion followed. On the afternoon of the following day the paper from Glasgow (written mainly by M. Sachs) was read by R. B. Lawson, on "Education for what?" and was followed by a discussion opened by A. Jennings, Esq., B.V.SC., M.R.C.V.S.

About 20 students stayed on over Tuesday and had a most enjoyable visit to Evans Biological Institute, Runcorn (by kind permission of Dr. Riding) and to the Liverpool University Field Station, "Leahurst."

At a business meeting R. S. Orr (Glasgow) was elected President of the A.V.S. and it was decided to hold the 1950 conference in Glasgow.

A feature of the sporting side of the occasion was the Rugby Knock-out Tournament for the N.V.M.A. Cup, the games being played at Liverpool University playing fields. The morning on the first day was devoted to the playing-off of the first round, when Liverpool beat London by 14pts. to 5 and Edinburgh defeated Glasgow by 19pts. to 3. Needless to say, most of the students spent the afternoon watching the Grand National. The final of the tournament was played on Monday morning, when Edinburgh triumphed over Liverpool by 30pts. to nil, the speed and accurate handling of the Edinburgh backs being too much for Liverpool's defence. Mr. J. C. Baird, M.R.C.V.S., President of the Lancashire V.M.A., handed the Cup to the Edinburgh captain at the Monday afternoon session. A sincere vote of thanks was passed by the students for the generosity of the N.V.M.A. in presenting the cup.

A full account of the conference, included with other articles, will appear in the June issue of the *A.V.S. Journal* together with photographs of the Council, and the Edinburgh and Liverpool Rugby XV's.

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A New Institute for Animal Husbandry Research in Pakistan

With the division of the Indo-Pakistan Sub-continent in 1947 the Veterinary Research Institute at Mukteswar fell into the area assigned to India, and Pakistan had no similar institute. The Government of Pakistan has, therefore, decided to set up a new Animal Husbandry Research Institute at Peshawar, in the North-West Frontier Province, under the charge of Dr. M. Abdussalam, L.V.P., PH.D. A substation, under Mr. S. R. Hassan, M.R.C.V.S., had previously been set up at Comilla, in East Bengal and another one will be opened sometime in the future at Quetta, near Baluchistan.

It is stated that Peshawar is near the areas where hill cattle, so useful in rinderpest work in India, are available and that it has convenient road and rail connections. The Provincial Government has been able to place certain buildings and equipment at the disposal of the new Institute, near Bala Hissan, where there is sufficient space for future expansion.

For the present the main function of the Institute will be the production of certain sera and vaccines, etc. It is hoped that later there will be development of its scope within the requirements of Animal Husbandry. At present there is a team of 16 workers, seven of whom have visited the United Kingdom or America for advanced training in such subjects as bacteriology, pathology, parasitology, animal breeding, poultry science, pests of hides and skins, and the manufacture of sera, vaccines, etc. This team will be expanded as time goes on.

Immediate disease subjects that provide an outlet for the activities of the staff are rinderpest, haemorrhagic septicaemia of cattle, Newcastle disease, and parasitic infestation. Studies are planned for a later date on the relationship of climate to disease and of breed adaptability to climatic conditions. Dr. Minett has worked on these subjects and these activities will be expanded.

Post-graduate instruction will be one function of the Institute and this will be on comprehensive lines.

The Institute was formally opened on March 17th, by the Hon. Khan Abdul Qayum Khan, Premier of the North-West Frontier Province.

We note with great interest these developments of the work of our colleagues in Pakistan. They have had to start with very little in the way of organised laboratories, and have lost no time in laying the foundations for ambitious enterprises. Pakistan is a country where distance is more important than in almost any other. Large and important territories are widely separated from each other; space is reckoned in units of a thousand miles. Their many friends in Britain will watch their progress and applaud their successes.

ALFORT VETERINARY SCHOOL CONGRESS

After a break of ten years, due to the war, the Alfort Veterinary School will hold a Congress from Thursday, June 9th, to Sunday, June 12th, under the presidency of Professor Bressou, the Director. There will be a series of lectures, film shows, demonstrations, and exhibits, with a garden-party to round things off. Visits will be made to veterinary centres, such as those connected with A.I. and foot-and-mouth disease control. Foreign delegates will be most warmly welcomed, and both scenic and gastronomic delights are forecast. Enquiries concerning subscriptions, reduced fares, details of the programme and of accommodation in Paris for the Congress itself, should be addressed to Monsieur le Professeur Vuillaume, à l'Ecole Veterinaire d'Alfort, (Seine), France.

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Scheme for the Control of Diseases of Dairy Cattle

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE QUARTER ENDED MARCH 31ST, 1949

County	Undertakings Notified		Total Undertakings	Number of Cattle	
	During Quarter	Previously		Cows	Heifers
ENGLAND					
Bedford	—	4	4	65	29
Berks	—	28	28	871	600
Bucks	1	5	6	143	139
Cambridge	—	—	—	—	—
Cheshire	3	75	78	2,612	1,168
Cornwall	—	—	—	—	—
Cumberland	1	1	2	96	90
Derby	16	144	160	4,367	2,541
Devon	2	81	83	1,130	692
Dorset	—	2	2	41	16
Durham	4	111	115	2,964	1,357
Essex	4	77	81	3,195	2,355
Gloucester	1	19	20	621	637
Hampshire	7	79	86	2,994	2,579
Hereford	—	3	3	159	162
Hertford	6	18	24	806	582
Hunts	—	—	—	—	—
Isle of Ely	—	—	—	—	—
Isle of Wight	—	—	—	—	—
Kent	4	45	49	1,084	794
Lancs	3	47	50	1,728	672
Leics	4	52	56	1,504	1,315
Lincs (Holland)	—	—	—	—	—
Lincs (Kesteven)	—	8	8	84	81
Lincs (Lindsey)	—	7	7	109	113
Middlesex	1	1	2	28	5
Norfolk	4	20	24	1,074	669
Northants	—	15	15	302	406
Northumberland	5	23	28	831	627
Notts	11	77	88	2,000	937
Oxford	—	4	4	119	163
Rutland	—	—	—	—	—
Salop	7	43	50	7,534	1,127
Soke of Peterborough	—	—	—	—	—
Somerset	4	64	68	1,702	1,142
Staffs	7	77	84	2,741	1,811
Suffolk (East)	—	6	6	86	112
Suffolk (West)	9	9	18	490	402
Surrey	3	21	24	849	465
Sussex (East)	—	41	41	1,325	970
Sussex (West)	1	30	31	823	649
Warwick	2	38	40	1,265	627
Westmorland	—	3	3	49	21
Wilts	1	11	12	287	145
Worcester	10	57	67	1,321	730
Yorks (E.R.)	2	31	33	546	486
Yorks (N.R.)	5	39	44	899	531
Yorks (W.R.)	5	65	70	1,767	780
TOTAL, ENGLAND	133	1,481	1,614	50,611	28,727
WALES					
Anglesey	2	8	10	153	106
Brecon	—	—	—	—	—
Caernarvon	5	9	14	176	76
Cardigan	5	22	27	575	330
Carmarthen	13	81	94	1,869	1,003
Denbigh	—	8	8	170	65
Flint	—	21	21	547	217
Glamorgan	—	26	26	443	208
Merioneth	—	—	—	—	—
Monmouth	1	5	6	139	91
Montgomery	4		5	55	18
Pembroke	2	5	7	208	229
Radnor	—	1	1	5	1
TOTAL, WALES	32	187	219	4,340	2,344
TOTAL, ENGLAND AND WALES	165	1,668	1,833	54,951	31,071

Notes.—(1) Operative periods of undertakings: 1 year, 486; 2 years, 99; 3 years, 1,248. (2) Undertakings renewed for further periods: 1 year, 59; 2 years, 3; 3 years 32. (3) Undertakings not renewed at end of operative periods: 334. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for further periods. Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings in Force		
	During Quarter ending 31.3.49	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	—	15	15	782	479
Angus	—	10	10	580	348
Argyll	—	—	—	—	—
Ayr	—	3	3	104	77
Banff	—	—	—	—	—
Berwick	—	1	1	22	7
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	—	—	—	—
Dumfries	—	4	4	195	158
Dumbarton	—	1	1	12	10
East Lothian	—	1	1	20	8
Fife	—	20	20	775	534
Inverness	—	1	1	52	35
Kincardine	—	2	2	67	56
Kinross	—	3	3	59	43
Kirkcudbright	—	4	4	665	508
Lanark	—	2	2	100	78
Midlothian	—	—	—	—	—
Moray	—	—	—	—	—
Nairn	—	—	—	—	—
Orkney	—	—	—	—	—
Peebles	—	—	—	—	—
Perth	—	5	5	104	100
Renfrew	—	1	1	31	34
Ross-shire	—	3	3	184	79
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	3	3	137	140
Sutherland	—	2	2	39	34
West Lothian	—	1	1	17	29
Wigtown	—	11	11	970	506
Zetland	—	—	—	—	—
TOTAL	—	93	93	4,915	3,263

Notes.—(1) Duration of undertakings: 1 year, 29; 2 years, Nil; 3 years, 64. (2) Undertakings renewed for a further period (included in the second column of the statement): 1 year, 14; 2 years, Nil; 3 years, 17. (3) Undertakings expired and not renewed (not included in the second column of the statement): 19 (Cancellations not included) (4) The figures in the first column of the statement relate to entirely fresh undertakings.

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STUDENT AND TEACHER HOLIDAY GRANTS FOR CZECHOSLOVAKIA

The British Council announces that the Czechoslovak Ministry of Education proposes to award 20 holiday grants to British students and teachers who intend to visit Czechoslovakia during the summer vacation of 1949, *i.e.*, for a period of not less than a month between July 1st and September 15th. The value of each grant is 5,000 Crowns (approx. £25). The grants can be drawn at the Czechoslovak Ministry of Education (Dept. 6), Wallenstein Palace, Prague III. Successful candidates must pay their own travelling expenses to and from Czechoslovakia. The second-class return fare (as at April 1st, 1949) is £22. The single air journey London-Prague costs £20. Applicants should be prepared to make their own arrangements for their stay in Czechoslovakia, subject to such local restrictions as may be in force at the time. It may be possible for grant holders to be admitted to certain youth camps and special courses, including courses in Slavonic languages. Full details are not yet available.

Applicants should state their age, supply the name and address of a referee, and give an account: (i) of their educational background; (ii) of their proposed itinerary and subject of study (if any) in Czechoslovakia.

Applications (closing date May 10th) should be sent to: The Controller, Education Division, The British Council, 3, Hanover Street, London, W.1.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Lincs. (Holland).—155, Curlew Lodge, Sutton Bridge, Lincs. (April 10th).

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TRIVIA

It is sad commentary on present-day education that the only way to tell a goose from a gander is to kick it. (*According to a Wiltshire N.A.A.S. expert*). No wonder sex education is being taught in school!—*The Dairy Farmer.*

The Council of the Linnean Society of London has awarded the Linnean Medal for the year 1949 to Professor D. M. S. Watson, Jodrell professor of zoology and comparative anatomy at University College, London. Linnean Medals have also been awarded to Dr. W. T. Calman, lately keeper of zoology in the British Museum (Natural History), and Professor F. E. Weiss, emeritus professor of botany in the University of Manchester, in respect of the war years during which no awards were made.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible.

DISTEMPER AND HARD PAD DISEASE IN DOGS

Sir,—As a comparatively inexperienced graduate I have felt reluctant to record a doubt where more experienced members have remained silent and therefore apparently in agreement. However, the Central Veterinary Society, in its discussion reported in the *Record*, April 2nd, 1949, has brought the above matter into the light.

In my experience some otherwise typical cases of distemper have shown the symptom of hard pads. Both before and since the publicity given to so-called hard pad disease I had treated them in exactly the same way as other distemper cases. It is my impression (and only an impression, for I have not kept detailed records from which I could be more definite) that these cases show no different reaction to the treatment from the cases which have no macroscopic hardening and thickening of the pads.

A practitioner less than ten miles away claims to have seen many cases of hard pad disease, but I, alas, am floundering—for I know not whether I have seen true hard pad disease (if such exists), and have been unable to recognise it, or whether I have as yet not come in contact with the disease (again, if such exists). My own feeling is that perhaps this so-called hard pad disease is merely a manifestation of distemper, and I feel that the opinions of more of the experienced practitioners on the lines of the C.V.S. discussion would do much to clarify the position.

Yours faithfully,

1, Marsh Street, A. V. Clarke.
Walsall,
Staffs.
April 4th, 1949.

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THE "OPEN" COLUMN

Sir,—I think facts do not support Mr. Gould's observation "The supplement provides full scope for such communications and for any discussion which may emanate therefrom."

I should like to examine this statement in relation to the correspondence on night veterinary services in the metropolitan area to which Mr. Gould makes particular reference and which he considers should be relegated to the supplement. During 1948, the supplement was published six times. Now, at this rate, Miss Joshua and Mr. Geffen would have to wait two months before they could reply in the supplement to Major Hancock's letter, and four months would have to elapse before the correspondence could reach its present stage—a stage which has been reached in two weeks in *The Veterinary Record* itself. Personally, I think it is impossible to carry out any "live" discussion in the supplement at its present rate of publication.

I appreciate fully the fears expressed by several officers of the N.V.M.A. that their work may be impeded by correspondence in *The Veterinary Record*, as some non-members undoubtedly have the opportunity of reading it. However, many other professional associations have to contend with similar problems. A study of some of their official journals has convinced me that their solution has not been to suppress comment but to permit free discussion, thus illustrating to *all* their readers the democratic state of their organisation and deriving strength therefrom.

It must also be remembered that *The Veterinary Record* was founded by a veterinary surgeon for veterinary surgeons and, if members of the N.V.M.A. desire opportunity for correspondence, it is the duty of the officers to endeavour to provide a satisfactory medium for it.

Yours faithfully,

40, Cholmeley Park, Highgate, N.6. H. Williams Smith.
April 4th, 1949.

Sir,—It is gratifying to see that my previous note on this subject has stimulated some discussion. May I, through the correspondence column of the *Record*, extend my thanks to the contributors concerned. One hopes it may continue and that the effort will finally, as these correspondents suggest, persuade the Council to reverse their decision on this matter.

A letter from Professor McCunn, dated March 15th, 1949, appearing in the *Record* on March 26th, 1949, makes one wonder if this column should be really referred to as the "more or less" Open Column. That is, more open to some than others.

Professor McCunn asks five questions—questions which one welcomes, too—in connection with the personnel of the profession—its numbers and prospects.

During the last five years I have, from time to time, written to you, Sir, discussing these queries. I have had, on occasions, the greatest difficulty in persuading the "persons responsible," to publish my views in the *Record*. The first letter I sent was held up for weeks because, whilst my views were regarded as true, it was thought advisable to publish it in the supplement. I strongly objected to this, and eventually was given space in the *Record*. The conclusion one drew was that letters written about assistants, and their future, were not at all welcomed. May I congratulate Professor McCunn on having *immediate* publication in the *Record* on a subject which, if mentioned by me—an assistant—would probably have been held up or offered space in the supplement.

Professor McCunn asks who is responsible for the increase in the number of veterinary graduates. Surely the profession itself is entirely responsible. In 1944 the Divisions of the "National" were discussing the Loveday Report and talking of producing more veterinary surgeons. At a divisional meeting at Newcastle that year I ventured to suggest that this production drive might mean unemployment along with a lowering of conditions of employment to those accepting positions. One also reminded those present that, owing to a campaign in 1934-35 to create more veterinary surgeons, the years 1940-42 meant unemployment to many newly qualified. My words at this meeting were like "water on a duck's back." Many practitioners agreed that there would be a need for more men. But it is so easy to agree to something which, if it materialises, is not going to do you any harm and might do you good.

Professor McCunn suggests that if his doubts have any substance drastic action is necessary. Before any action at all one would certainly welcome the views from members of all sides of the profession, and from those who are to be members in the near future.

Yours faithfully,

Fieldhead, J. E. Johnson.
Whickham,
Newcastle-on-Tyne.
March 28th, 1949.

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R.C.V.S. ELECTION, JUNE, 1949

Sir,—A glance at the Voting Paper for the above shows a list of 25 candidates, then a list of proposers—practically the same names though in a different order. "A" proposes "B" and *vice versa*.

I must confess complete ignorance as to how this list of candidates was chosen, when and by whom. Perhaps I have overlooked something I should have read.

Could one of our members enlighten me please?

Yours faithfully,

Fieldhead, J. E. Johnson.
Whickham,
Newcastle-on-Tyne.
March 28th, 1949.

[Any person who is a member of the Royal College of Veterinary Surgeons may be nominated for election to Council provided that he is proposed and seconded by persons who are also members of the Royal College. There is nothing in any enactment relating to the Royal College, to prevent "A" from proposing "B" and *vice versa*. A special article was published in *The Veterinary Record*, December 4th, 1948, giving full particulars regarding the elections to Council this year and explaining the reasons for the changes from the procedure in previous years. This article stated that all nominations for election to Council must be received by the Registrar of the Royal College not later than January 31st, 1949. The list of candidates contained in the voting paper sent to every member of the Royal College is the list of persons who had sent in nomination papers duly completed before that date. The list, contrary to the suggestion made by the writer, was not selected by any person or persons at any date.—*Editor.*]